
Primula calyptrata, a New Species in Section *Carolinella* (Primulaceae) from Yunnan, China

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ABSTRACT. *Primula calyptrata* X. Gong & R. C. Fang (Primulaceae) is described and illustrated. Analysis of its habitat, distribution, and capsule morphology indicates that this species is a member of *Primula* sect. *Carolinella* (Helmsley) Pax, which is endemic to humid subtropical regions of Yunnan, China, northern Vietnam, and Thailand, and characterized by an unusual calytrate capsule.

Key words: China, *Primula*, Primulaceae, section *Carolinella*, Yunnan.

During an investigation of plants in southeastern Yunnan, China, in April 2001, some specimens of *Primula* were collected and recognized as a new species. After further studies, the species was believed to belong to section *Carolinella*. Living plants were introduced into Kunming Botanical Garden for cultivation and observation. Specimens were also collected by Shui Yu-min et al. from Zhongzai in Malipo County, Yunnan Province, in 2002.

Members of section *Carolinella* are unique in *Primula* for having a calytrate capsule with a circumscissile lid, a feature also shared by the genera *Pomatosace* Maximowicz, *Anagallis* L., *Soldanella* L., and *Bryocarpum* Hooker f. & Thomson in Primulaceae (Pax & Knuth, 1905). The evolutionary trend of the fruits in Primulaceae is believed to be from indehiscent capsule to valvate capsule to calytrate capsule with a circumscissile lid (Hu Q-M., 1994; Chen F-H. & Hu, 1990). This feature in section *Carolinella* is a link between *Primula* and the other genera; however, other morphological characters and distribution clearly separate them. The phylogenetic relationships among other sections in *Primula* and other genera of Primulaceae are still unclear because studies are lacking in chromosome number, pollen type, and seed morphology. The phenomenon that the calytrate capsule occurs in the genera *Pomatosace*, *Anagallis*, *Soldanella*, and *Bryocarpum* in Primulaceae may be a result of convergent evolution (Kong & Liu, 1999).

Section *Carolinella* is believed to be a primitive

group in *Primula* (Hu Q-M., 1994); this new taxon is considered to be primitive for having alternate and long-petioled leaves, 2–2.5 cm long stems, and homostylous flowers. In addition, *Primula* sect. *Carolinella* is a typical endemic of East Asia and is limited to southwestern and southern China and adjacent North Vietnam and Thailand. Eleven species were recognized in this section: almost all are stenochoric and have very small populations, some of which are in imminent danger. All of the species in this section occur in the warm-moist southern subtropical evergreen broadleaf forest of low altitudes within the limestone region.

Primula calyptrata X. Gong & R. C. Fang, sp. nov. TYPE: China. SE Yunnan: Malipo County, Xiajinchang, 1870 m, 16 Apr. 2001, X. Gong 02815 (holotype, KUN). Figure 1.

Species in hac sectione caulibus brevibus, foliis subtus purpuratis valde differt. Planta *P. intanoensi* e Thailandia valde proxima, sed caulibus 2–2.5 cm longis, foliis alternantibus, corollis purpureis, tubis 1.7 cm longis, limbis 1.5–1.8 cm in diam., pedicellis 2–4 mm longis differt.

Herbs perennial, completely efarinose, stems and both surfaces of leaf blade as well as petioles with dense articulated hairs. Rhizome elongated, 2 cm long, with numerous fibrous roots, producing 1 or 2 leaf-bearing stems above. Stem 2–2.5 cm long before or in anthesis, purple. Leaves alternate, leaf blade suborbicular, 2.8–4 × 2.6–3.8 cm, apex rounded, base cordate, margin irregularly undulate, thick-papyraceous when dry, grayish green above, purple below, midrib and 4 pairs of lateral veins obscure above and plane but distinct below; petiole 2.5–5.5 cm long. Scape 1 or 2, 12–18 cm high, sparsely white villous, with 1 to 2 superimposed umbels with 2 to 5 slightly secund flowers in each; pedicels 2–4 mm long, with dense articulated hairs; bracts ovate-lanceolate, 4–6 mm long, prominently 1-nerved, with dense articulated hairs; calyx campanulate, 5–6 mm long, with dense articulated hairs, divided to 1/2–1/3 into ovate-triangular lobes, lobe with 3 distinct nerves; corolla purple with a yellow eye, salverform, pubescent outside,

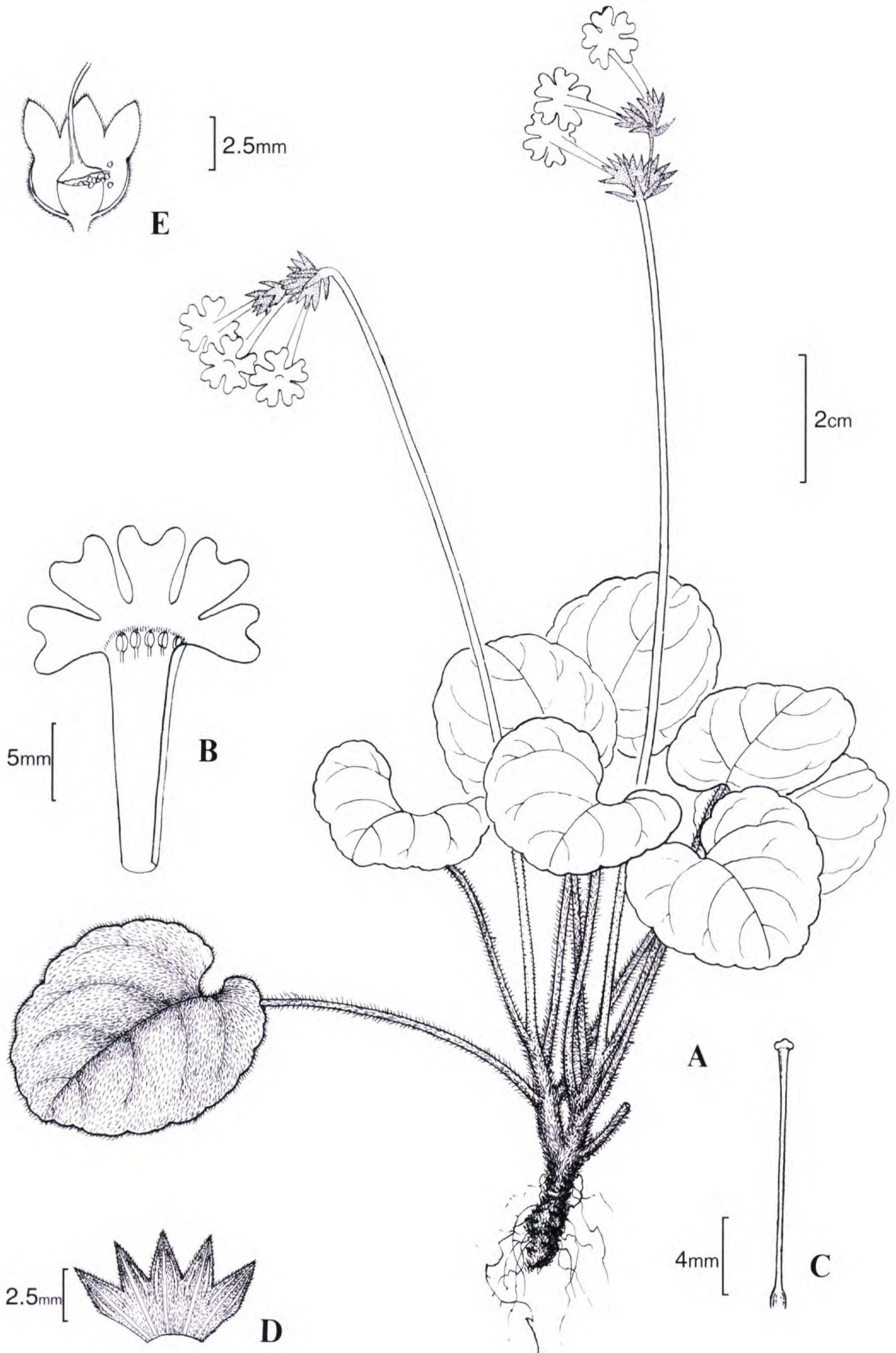


Figure 1. *Primula calytrata* X. Gong & R. C. Fang. —A. Habit. —B. Opened corolla, internal view showing the position of the stamens and hairs. —C. Pistil. —D. Opened calyx, external view—E. Capsule, showing dehiscent manner. Drawn by Yang Jian-kun from the holotype, X. Gong 02815 (KUN).

tube 1.7 cm long with a hairy annulus inside, limb 1.5–1.8 cm diam., lobes oblong-obovate, deeply emarginate; homostylous, stamens inserted in throat, anthers below annulus; style ca. 1.7 cm, subequal to corolla tube. Capsule enclosed in calyx tube, dehiscing by means of a calyptra.

Distribution. Known only from the type and paratype specimens collected from both Xiajinchang and Zhongzai forests of Malipo County of southeastern Yunnan, China.

Habitat and phenology. Understory species in an evergreen broad-leaf forest composed of members of the Magnoliaceae, Fagaceae, and Lauraceae, growing on limestone with moss; alt. 1700–1870 m; flowering March–April, fruiting in August.

Primula calyprata is distinguished from the other species of *Primula* sect. *Carolinella* by having short stems and a leaf blade that is purple on the abaxial surface. This species is closely related to *Primula intanoensis* T. Yamazaki collected from Thailand, but can be distinguished by stems 2–2.5 cm long, leaves alternate, corollas purple, tubes 1.7 cm long, limbs 1.5–1.8 cm in diameter, and pedicels 2–4 mm long. *Primula intanoensis* is stemless, with leaves in a rosette, corollas white, tubes a little longer than to half again as long as the calyxes, limbs 0.8 cm in diameter, and pedicels 5–7 mm long.

Paratype. CHINA. **SE Yunnan:** Malipo County, Zhongzai, 1700 m, 23 Mar. 2002, *Yumin Shui et al.* 20336 (KUN).

With the inclusion of the species described here, 11 species are known in *Primula* sect. *Carolinella*.

KEY TO THE SPECIES OF *PRIMULA* SECTION *CAROLINELLA*

- 1a. Inflorescences umbellate, umbels 1 or 2 superimposed, 2- to 6(9)-flowered; leaf blade pubescent.
 - 2a. Leaf blade suborbicular or ovate-elliptic, base distinctly cordate, both surfaces markedly pubescent; flowers homostylous.
 - 3a. Stem 2–2.5 cm long, leaves alternate; corolla purple, tube 1.7 cm long, 2–3 times as long as calyx, limb 1.5–1.8 cm diam.; China
. . . *P. calyprata* X. Gong & R. C. Fang
 - 3b. Stem absent; leaves a rosette; corolla white, tube a little longer than to half as long again as the calyx, limb ca. 0.8 cm diam.; Thailand
. *P. intanoensis* T. Yamazaki
- 2b. Leaf blade oblong, elliptic, broadly ovate or broadly elliptic, base broadly cuneate or cordate, both surfaces pubescent or adaxially glabrous; flowers heterostylous.
 - 4a. Pedicel and calyx glabrous; leaves densely pilose on both

- surfaces; China
. . . *P. levicalyx* C. M. Hu & Z. R. Xu
- 4b. Pedicel and calyx fulvous pilose; leaves pubescent on margin and abaxial surface.
- 5a. Leaf blade subcordate or rounded at base; calyx 4.5–7.5 mm, parted to middle; China
. . . *P. wangii* F. H. Chen & C. M. Hu
- 5b. Leaf blade cuneate or rounded at base.
 - 6a. Calyx 3–4 mm, parted to 2/3; China
. *P. kweichouensis* W. W. Smith
 - 6b. Calyx 6–7 mm, parted to 1/3; China
. . . *P. kwangtungensis* W. W. Smith
- 1b. Inflorescences abbreviated or almost umbellate, (6)12- to 28-flowered; leaf blade glabrous or glabrescent; flowers heterostylous.
 - 7a. Leaf blade acute or acuminate at apex.
 - 8a. Leaf blade cuneate or rounded at base; calyx ca. 3 mm, inconspicuously 5-veined; China, Vietnam
. *P. henryi* (Hemsley) Pax
 - 8b. Leaf blade cordate at base; calyx 7–10 mm, prominently 10-veined; China, Vietnam . . . *P. chapaensis* Gagnepain
 - 7b. Leaf blade obtuse or rounded at apex.
 - 9a. Leaf blade cordate at base.
 - 10a. Leaf blade elliptic-ovate to broadly ovate, 4.5–6 × 3.5–5.5 cm; petiole 2–5 cm long; Vietnam
. . . *P. cardioeides* W. W. Smith & H. R. Fletcher
 - 10b. Leaf blade oblong to suborbicular or ovate-rounded, 7–18 × 5–15 cm; petiole 7–26 cm long; China . . . *P. partschiana* Pax
 - 9b. Leaf blade broadly cuneate to subrounded at base; China
. *P. rugosa* N. P. Balakrishnan

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